1.6 The Executive Office of the President Takes Notice

The presence of the science apparatus in the White House, as a formal goes back to 1954 when President Eisenhower appointed a task force of scientists and engineers to advise him on Polaris, ballistic missiles and the U-2 jet intelligence gathering aircraft. During that year, the Science Advisory Committee of the Office of Civil Defense Mobilization was formed. Long before, there were intermittent White House initiatives involving science and technology in the Federal agencies. World War II was a turning point as science and technology were galvanized and mobilized to serve national security. In 1950, the National Science Foundation Act was passed, and the Federal government was well on its way to harness the research community to national goals. President Eisenhower, who headed the allied military forces in Europe during the War was fully informed about the shift from "Small Science" to "Big Science" that was taking place in the United States.

Hence, it was not surprising that he created the position of the White House Science Adviser. He invited James R. Killian of the Massachusetts Institute of Technology to serve as the Special Assistant to the President for Science and Technology in 1957. In the same year, the Science Advisory Committee, Office of Civil Defense Mobilization,was moved to the Executive Office of the President and renamed the President's Science Advisory Council (PSAC). Killian was named the chairman of this group. During the same year, a review was undertaken that resulted in several key changes in the National Science Foundation.

The next year, 1958, was the year that science communications began to get attention. The Baker report was prepared for PSAC which affirmed the principle that the free flow of knowledge as indispensable to the advancement of science. The Baker panel was made up primarily of distinguished scientists and engineers. The chairman was the President of the Bell Telephone Laboratories, perhaps the most outstanding accumulation of scientists dedicated to science, communication and information in the world. Dr. William O. Baker has maintained his interest in science communications over the years, and at one time was a Member of the U.S. Commission on on Libraries and Information Science. When the President approved the PSAC Report, the Golden Age of Federal Scientific and Technical Information began. During the same year, the National Defense Education Act was passed. This law created the Office of Science Information Service and the Science Information Council, an advisory group made up of advisers from the worlds of science, engineering and information. Dr Burton Adkinson was chosen to direct OSIS. His accomplishments during the decade of the 1960s were formidable in helping the professional societies and other groups move into the new information age. Equally, important, as covered in the previous section, was the work of Senate Committee, headed by Senator Hubert H. Humphrey, was held hearings on Federal scientific and technical information needs during 1958.

In 1959, the President wrote to NSF asking this agency to take the lead in implementing the Baker Report. In the same year, the Federal Council for Science and Technology was formed by the Special Assistant to the President for Science and Technology and the President. Like PSAC, the Federal Council was to be chaired by the Special Assistant. The interagency group on scientific and technical information group was formed by Adkinson and called the Federal Advisory Committee on Scientific Information (FACSI). Also in 1958, the House Science and Astronautics Committee held hearings on the dissemination of science information.

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During the next two years, Congress continued to hold hearings on the subject of Federal scientific and technical information, building up a remarkable store of knowledge in the process. Senator Humphrey referred to the Federal scientific and technical information programs and methods as "Model T" performances. Stung by the criticism and congressional pressure, the Science Advisor commissioned the Crawford task force to undertake another study on Federal scientific and technical information. This study was completed in 1962. This was the same year that saw the issuance of Presidential Reorganization Plan No. 2, which created the Office of Science and Technology with the responsibility to advise and assist the President, coordinate Federal research and development programs, to provide advice on agency plans, policies and programs, and to review and integrate the Federal research and development programs. The Plan also laid out a course of actions to be undertaken in the scientific and technical information area. One of these actions resulted in the formation of the Committee on Science Information (COSI) to replace the Federal Advisory Committee on Scientific Information (FACSI). Discussions with Adkinson disclosed that he believed that it was more practical to place this coordinating effort under the Federal Council for Science and Technology as the umbrella group with more authority and clout. During this year, a new Director for the National Science Foundation was designated, a move which strengthened the hands of the Science Advisor to the President, and probably had a beneficial effect on the improvement of Federal agency scientific and technical information programs, as well. The elevation of the Federal agency scientific and technical information program was a signal to the heads of the agencies for accelerated actions for their agencies.

The momentum continued to stimulate action. On January 10, 1963, the President's Science Advisory Committee issued its report on Science, Government and Information, which recommended actions for the government

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and the technical community (scientists and engineers) to improve the transfer of information. So important was it considered that President John Kennedy affixed a statement to the report calling on the two communities to give serious consideration to the implementation of the recommendations the panel made. Also in 1963, the Federal Council for Science and Technology formed the Committee on Scientific and Technical Information, then called for a new charter to expand its responsibilities beyond those of the Committee on Science Information that it replaced. The first chairman of COSI was Admiral Charles Martel in the Office of the Secretary of Defense. He was succeeded by ~~Major~~ General William J. Ely, also of that office. Both of these officers were excellent leaders who did much to launch the program in a vigorous way.

During this period, Jay Hilary Kelley, a technical assistant to the Science Advisor, was made responsible for scientific and technical information matters, but was not responsible for the specific operation of COSATI, except for oversight on behalf of the Science Advisor. Like the two military officers who successively chaired COSATI, Kelley did much to launch the program in its early days. The Executive Office of the President continued to interact with leaders in Congress who continued to hold hearings on scientific and technical information matters. Representative Roman Pucinski, headed up an ad hoc committee of the House Committee on Education and Labor, focusing directly on the Office of Science Information Service and a proposal for a "monolithic"Scientific Information Data Processing Center that would answer the challenge of a similar organization called VINITI that was established earlier by the Soviet government.

The year 1964 saw COSATI's new charter approved by the Federal Council for Science and Technology, but even more significant was a decision on

the part of the Science Adviser to bring COSATI directly into the Executive Office of the President to operate directly out of his office. At this time, he brought in a new chairman for COSATI, who also served as his technical assistant for scientific and technical information as a member of the staff of the Office of Science and Technology. The Executive Secretary of COSATI, Colonel Andrew A. Aines, then joined the new Chairman, William T. Knox, freshly from Esso Research Co., as the second technical assistant in OST. Aines was detailed from the Department of Defense for the purpose. Within the year, COSATI completed its first Summary Progress Report and a second report - a review of agency spending on scientific and technical information.

Congress continued to maintain a strong interest in scientific and technical information matters both in the House and the Senate. The Executive Branch matched this interest by a number of actions to strengthen the effort both in the Executive Office of the President and within individual agencies that were involved in research and development. Some early actions were taken by earlier Advisers, James R. Killian and George B. Kistiakowsky, but the scientific and technical information program got its first impetus during the time Jerome E. Wiesner as the Science Advisor. The major architect, however, was Donald F.Hornig who had the clarity of vision to understand that the success of COSATI could only come when it operated at a level above the Federal agencies themselves. He acted on this understanding, and through his actions COSATI and the Federal scientific and technical information programs reached their highest pinnacle. At the departure of Donald Hornig, Lee A. DuBridge, the new Science Advisor, followed his blueprint and COSATI became even more productive as long as he remained in the White House. When he completed his stay, he was replaced by Edward David, Jr.as the Science Ad-

visor. It was during this period in the early 1970s that the bottom dropped out of the COSATI program as it was sent to the Office of Science Information Service in the National Science Foundation to be managed. David, who did not know very much of the history of COSATI and why it was brought to the Executive Office of the President, made the decision unilaterally without discussing it with his own technical assistant, a failure hard to understand or justify. His decision was not applauded in Congress, which was fully aware that once the control of COSATI was passed back to the National Science Foundation, it would be a signal to the Federal agencies that the "heat for improved scientific and technical information programs was off."

But apparently this was not the only mistake made by the Science Advisor, because President Richard M. Nixon dismissed him in 1973 along with the White House science mechanism, largely because of his pique against scientists who he felt were undercutting him and his policies. These two decisions, one made by the Science Advisor and the other by the President did much to set back science, technology and their sibling scientific and technical information for at least the rest of the decade.

1.7 Professional Societies React to the Challenge

The custodians of scientific and technical information for generations before the arrival of the Information Age, learned and technical societies quickly reacted to the proliferation of new knowledge ushered in by "Big Science." They recognized that the increase of scientists and technologists in virtually all fields of science and technology, which promoted more literature and data, called for extensive modification of their communication processes. The understood, as did the developers of the mission-based information systems of the Federal agencies and in industry, that there would have to be new methods of controlling the literature, communicating with their members, extending the "invisible colleges", screening and referreeing the increased input seeking space in their journals, employing computers and new information technology to handle larger volume more rapidly and efficiently, and while all of this was happening, seek new ways to keep costs of their operations and products down so that their members could afford them.

The professional societies also recognized that the cost of modernizing their programs to embrace the machinery of new information technology was beyond their means. It was a quirk of good fortune that there was a willingness on the part of the Federal government to give them a hand. In fact, history reveals that the relationship of some of the Federal agencies with publishing societies was warm and cooperative for decades before the end of World War II. The Department of Interior, the National Bureau of Standards, the Department of the Army, the Navy Department - these and others recognized the importance of the so-called "disciplinary"information systems that were established and maintained by the learned and technical societies. About a half-century before, in 1933, the National Bureau of Standards was given authority by Congress to pay page charges on papers that were written by NBS scientists and transmitted to scientific journals for publishing. The continuation of the page charge policy has to be one of the oldest information policies followed in the United States and in other countries. It was 28 years later, in 1961, that the page charge policy became government wide. Without this government support, professional societies in the United

States would have had a difficult time to continue their services. The largesse was not confined to scientific organizations in the United States, there have been occations when scientific journals in Europe were assisted by Federal R&D agencies. The increased assistance to the professional societies came from the National Science Foundation in the late 1950s and early 1960s. NSF's Office of Science Information Service, headed by Burton Adkinson at that time, provided millions of dollars to help a number of key professional societies modernize their information programs. As Adkinson used to say: "All I wanted from the professional societies was a real commitment to undertake the modernization process. A statement of verbal intention was not enough, however. The societies had to come in with well prepared plans on how they were going to get the job done. They also had to agree that the members of the societies would pick up the operating costs in the near future. NSF would not continue to subsidize these programs indefinitely." [1] More will be written about the special role that NSF played during its "golden age" in the information research and service areas, but all of the professional societies that received Federal support will acknowledge their debt to NSF and the Federal government.

There were other avenues of interaction that revealed the harmonious relationships between the Federal government and the professional societies. Government scientists were encouraged to participate in the affairs of the societies, their meetings, their symposia, and in publishing their conference proceedings. Many scientific meetings was supported in whole or in part by the Federal government. Many of the meetings were held at Federal laboratories to keep a lid on costs. Not enough has been written about the symbiosis between government administrators, legislators, scientists and engineers and the leaders of the learned societies. At the meetings of the Committee on Scientific and Technical Information and other Federal information management and coordination groups, members of the professional societies were in frequent attendance.

[1] These comments were made on many occasions to the author and during NSF budget hearings to the Executive Office of the President, the Congress, and in correspondence with professional societies.

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As the subsidies began to disappear in the 1960s, direct subsidies that were provided to assist the professional societies make the transition, the close interaction between the societies and the Federal agencies also decreased. The page charge policy continued, lower mail rates for professional publications continued, support of meetings and conferences also continued. But the close relationship between the society publication managers and the scientific and technical information managers of the Federal agencies was sharply curtailed. The termination of COSATI during the early 1970s and the Office of Science Information Services, NSF, later in the decade, had a devastating effect on the interaction between the two sectors. The teamwork which was so beneficial to the government and to the professional societies virtually came to an end. The process of dissolution can be traced to the "exiling" of COSATI to the National Science Foundation, the casting out of the Office of Science and Technology from the Executive Office of the President, and, to some extent, the failure of the leaders of science and engineering in the private and in the public sector to recognize what was happening and what the long term effect would be on the health of Federal and national science and technology. It was also disappointing that the operators of the professional society information and communication programs did very little to rally their society leaders to question the weakening of the Federal STI programs during the 1970s and 1980s.

Moreover, when the Office of Science and Technology Policy chose not to implement its legislated responsibility to provide leadership and the coordination that would keep the public and private sectors working in close harmony, the bonds that held the two communities together were severed. Even if the professional societies wanted to resume close interaction, there is not one person in the Executive Office of the President that is trained in the affairs of scientific and technical information, and there has not been any since 1971.Not one person is familiar with the scores of studies and reports that were undertaken or stimulated by Science Advisers and their staffs dealing with the accomplishments and failures in the past in the STI area, including the chapter on the interaction between the public and the private sectors concerned with science publications and science communications.

The professional society which perhaps more than any other in the United States has recognized the need of improved science communications in the Federal and the private sector is the American Association for the Advancement of Science. Accolades are due William D. Carey, its Executive Director, and the Editor of Science, Philip Abelson. Both have been steadfast in their public remarks about the importance of improved STI programs. In an editorial in Science, Abelson pointed out that efficient storage and retrieval of information for science, medicine and technology are of crucial importance as is the development of electronic databases accessible for online services. He stated that the National Technical Information Services and the National Library of Medicine provide key services that need to be continued in spite of threats resulting from Administration policy to reduce the size of government.[1] One of its key committees, Panel T, which is devoted to information computing and communications, is an active one that brings together scientists and other experts in these fields. A number of Panel T's officers have been elected as Fellows of AAAS in recent years. Abelson has participated in meetings of the American Society for Information Science and in informal meetings to seek improvements in science communications. Carey has also made himself available to discuss his views with the Federal Information Managers group and with the Board of Regents of the National Library of Medicine. Carey, who was one of the leaders in the old Bureau of the Budget, worked closely with the science community and was very familiar with the goals and actions of COSATI during the 1960s. There is every expectation that AAAS will continue to voice a strong view that Federal and private sector improvement of STI programs and processes are needed to achieve greater progress in American Science and Technology.

There is no doubt but that the National Academy of Sciences-National Academy of Engineering have occasionally become involved in matters pertaining to scientific and technical information and communication. Alone or together, they have been concerned with education and

[1] Abelson, Philip, Editorial in Science, May 28, 1982. page

computers, with telecommunications, the provision of scientific advice for Congress and the Executive Branch agencies, numerical data programs, International Critical Tables, biological and geological information programs, highway research information, medical science information, World Data Center A, and the formation of UNESCO's UNISIST (world information system in science and technology). At the request of NSF and the Office of Science and Technology, NAS-NAE created the Committee on Scientific and Technical Communication (SATCOM), whose report is discussed elsewhere in this book. Despite its long time involvement in STI and related matters, the Academies do not have resident experts in STI, nor do they have a continuing in-house program. Even though NAS is fully cognizent of the size and power of the revolution of information technology and how information will be handled and delivered in the future, it has not chosen to establish a standing effort. Of course, its National Research Council is ready, as always, to take on projects funded by Federal agencies on request, but the failure to invest in a continuing effort manned by consensus experts creates anything but a magnet to attract work requests from the government and the private sector. Considering the respect that all of science and technology have for the two academies, this is a sad state of affairs. The periodic intervention into STI matters is welcome to the information community, of course, but it is not enough. If NAS-NAE made science communications a matter of high priority, such an action would help bring more work to them. In turn, the information communities in the public and the private sectors would consider NAS-NAE more of a pivotal organization through which more progress could come.

It is unfortunate that the National Academy of Sciences is presided over by Frank Press, who,as first Director of the Office of Science and Technology Policy in the Executive Office of the President, did very little in the STI area. Since taking over the NAS, the only serious information effort undertaken by it was the study on university research and national security by a group under Dale R. Corsen, former president of Cornell University. It was an important study, but its focus was restricted to the merits of free flow of STI, only a small part of the complex of issues found in the STI area.

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Another professional society, the American Society for Information Science is the leading organization that is dedicated to information science and science information. It is therefore made up of academic scientists specializing in information research and development and practitioners providing information services of many kinds. Its early roots were in documentation, mostly scientific and technical documentation. Occasionally, ASIS shows how valuable it can be. Its annual meetings and its mid-year meetings are attractive, bringing together individuals and groups interested in issues, problems, new developments, and insights dealing with the march of information technology and techniques. In earlier years, there was an expectation that ASIS would flourish - grow by leaps and bounds - as the information revolution pressed forward in the United States and around the world. Unfortunately, internal problems dealing with organization and funding have sapped the strength of ASIS, hence it has not become the "power house" that many of its members expected. The potential for future growth and power is still possible. What ASIS needs is new, creative leadership and a burst of energy that will give it strength and vision. Many information scientists and information entrepreneurs fervently wish that this comes to pass.

1.8 Governments and International Organizations Enter the Picture

With a few exceptions, science communication was a province of the scientific societies up to about World War II. For the most part, national governments refrained from the governance of this province up to this time, although interaction between scientists and engineers with governments was fully evident, especially in areas dealing with national security, for many generations. A break in the continuity came in the mid-1920s in an area that only partially involved science and technology. This was when Lenin directed the victorious bolshevik party to gather information of every description from the capitalist world. The apparatus that was set up to accomplish this goal still operates with great skill and boldness today. As science and technology have become more central in the economic growth of countries, information generated in these two related fields, the fruit of research and invention, became even more precious.

During and after World War II, the United States assigned the Office of Strategic Services to "capture" many kinds of scientific and technical knowledge from defeated Germany. Much of the scientific and technical information that OSS harvested resides in the files of the National Technical Information Service today. But the Soviet Union and the United States are by no means alone. Virtually all countries gather technical information in countries where their embassies and consulates are located. The increase in the size of embassies in all advanced countries reflects the increase in the number of science and economic attaches they house. A number of countries have or have had special offices whose major function has been the gathering of scientific and technical information. The Japanese very diligently and systematically sift U.S. information sources, using its own nationals and American citizens in the search for valuable scientific and technical information. Germany has supported an office in the Washington area and so have the Scandinavian countries to harvest technical knowledge. The United Nations is a hotbed of "spies", it has been reported in many newspaper articles. The U.S. Department of Defense has "offices" in London and other foreign

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capitals that interact with scientists and engineers, collecting scientific and technical information in the process. A vast international intelligence effort is being undertaken by trained operatives from all advanced countries around the clock. Following the precedent of the fabled Marco Polo, traders, businessmen and others are on constant alert for tidbits of information about breakthroughs in technology or changes in organization of value. Visitors to Venice, Italy, can still see a considerable amount of scientific and commercial data that was collected by the Doges of Venice during the period when they flourished centuries ago. Scientists and engineers from all countries travel around the world attending conferences and symposia whose basic function is to share information. It is not the custom in the Free World for these travelers to be debriefed by their governments for valuable information, but this is not the case of countries behind the Iron Curtain. Usually, their authorization to travel abroad carries with it the requirement to prepare detailed reports of findings.

During and after World War II, when governments began to play a major role in science and technology, they found themselves in the scientific and technical information business. In the United States, as Federal research and development budgets began to grow, Federal agencies began to create information programs to serve their research and development programs and to disseminate the information that was being generated to other users in and out of the government. It has been said that the Federal agencies maintain the largest STI programs in the world, an assertion that the Soviet government might challenge, considering that country's vast outlay to gather and handle such information.What have been called "mission-serving" information systems took their place besides the "discipline-based" systems operated by learned societies in physics, chemistry, mathematics and other scientific and technical fields. While the government programs did not dominate those of the professional societies, it became evident in the 1950s and 1960s that the modernization of the latter's programs came at a cost beyond the capabilities of members of these societies. As mentioned elsewhere in this document, the societies had to seek public funds to survive and grow. On the whole, coordination developed between NSF's Office of Science

Information Service and the professional societies, also the Federal agency scientific and technical information managers and the professional societies, resulted in the financial transfusions needed to keep the professional societies solvent, if not flush with wealth. During this process, many of the professional societies recognized that the Federal agencies had achieved an equivalency in status, perhaps a superiority based on wealth. Arrangements were worked out so that professional societies were providing specific services to Federal agencies for which they received renumeration. Adkinson [1] wrote:

> From 1958 to 1971, the major funding source for discipline-oriented abstracting and indexing services was NSF's Office of Science Information Service. Between 1958 and 1964, OSIS aided many A&I services by financing deficits, underwriting the cost of initiation of of new products, supporting experiments on new automated techniques, and partially funding the National Federation of Science Abstracting and Indexing Services (now National Federation of Abstracting and Indexing Services)...

In essence, the Federal agencies became the financial partner of the societies, rationalizing what they were doing in the name of advancing American science and technology. It was a unique relationship that received little attention in the press and even in the world of science and technology. But it marked the transition from professional society control over information transfer to a shared control between the societies and the government. To a more limited extent, the same development took place in Western Europe, where governments began to play a more dominant role. The International Research Council had put through a proposal in 1919 to establish an international council for bibliography and documentation, a proposal that received a considerable amount of discussion, but was not implemented. It was in 1924 that the International Institute of Bibliography was reorganized into a federation of national scientific information bodies. This group became the International Federal for Documentation, which still exists, but many of the members are government information officials, rather than professional society documentatlists. During the first half of the 20th

[1] Adkinson, Burton W., Two Centuries of Federal Information, Dowden, Hutchinson & Ross, Inc., Stroudsburg, PA., 1978, p 123. Adkinson provides other examples of support provided to the professional societies 99 121-125.

century, a number of scientific organizations came into being, such as the International Astronomical Union (1919) and the International Geographical Union (1923), the descendants of the Royal Society of Great Britain, which began to publish in 1858, and other national societies. In 1931, the International Research Council became the International Council of Scientific Unions. International exchange of scientific information was and continues to be one of the important purposes of this organization. In 1952, ICSU formed the ICSU Abstracting Board, which is made up of information scientists and managers, many of whom have a distinguished station in scientific fields. ICSU was to play another important role in international scientific and technical information matters, when it joined with UNESCO to undertake a study on the feasibility of a world science information system (UNISIST). It fell to Professor Harrison Brown, Foreign Secretary of the United States National Academy of Sciences, to conduct the study, which he undertook with a distinguished group of scientists and information experts from all parts of the globe.

To those of us who attended the Conference that brought UNISIST into being in October, 1971, it was clear that UNESCO was the dominant partner in the transaction. It was just as evident that the balance of power had shifted to government representatives from ICSU-AB and other scientific organizations. The Information Revolution had brought forth another change in power for good or for bad. The UNISIST emergence is simply an example; there were other signs that governments were moving into the information central ring. Harrison Brown, whose herculean task midwifed the UNISIST arrival after two or more years of hard work, moved off to other fields of endeavor. Did he receive the applause of his fellow scientsts for his contribution in the United States? Hardly. Apparently, tensions and pressures broke out in Unesco itself about which group would be in charge. In the meantime, the United Nations,of which Unesco is part, began to become much more active in information matters. Competition broke out between the United Nations and UNESCO. This was very evident when the energy crisis began and a conference on renewable sources of energy for developing countries was placed on the UNESCO agenda. The information office of UN was arrayed against a counterpart

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group in UNESCO. At that time, it seemed that every one of the many UN bodies (FAO, WHO, etc.) wanted to get into the scientific and technical information business. It was reported (but not verified) that there were about 100 databases under UN body management operating on an international scale.

During the 1970s, a number of countries began to develop scientific, technical, economic and other databases. France, the United Kingdom, Holland, and West Germany set out energetically to create databases, stimulated undoubtedly by the breakaway movement in the United States, where the Federal agencies, along with a number of societies, to create them. Commercial vendors, some of whom had gotten valuable experience in working with the Federal agencies in establishing theirs, moved in rapidly to make Federal and other databases available to users on both sides of the Atlantic and perhaps the Pacific. The Common Market picked up the challenge and European countries quickly began to create an apparatus to underwrite and disseminate scientific and technical databases. the Communist Bloc, under the leadership of the Soviets,created a Comecon information program.

The process is under way. Professional societies started the movement. They were joined by governments when"small"science became "big" science, when STI proliferated to the point that government funds were needed, when research and development became entrenched in government, when all countries became aware that technical information became synonymous with national power, when international organizations decided that their future was tied to the "information kite", and, of course, when it was evident to all that new information technology was "rewiring" the way technical knowledge was going to flow in the future. What will happen in the future is not yet clear. Certainly, the philosophy of the Reagan Administration, which at the moment seems to be to reduce government information programs (among others), signals a change. On the other hand, the Administration's protection of Federal research and development programs operates to confuse the picture.